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Defining Ceramic Change and Cultural Interaction: Results of Typological, Chronological, and Technological Analysis of Guangala Phase Ceramics

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Introduction

The period between 500 B.C. and A.D. 500 was a time of dramatic changes in societal organization throughout the Intermediate Area (the Northern Andes). The rise of localized hierarchical systems during this period exemplifies the great range of possible social structures which are commonly classified as "chiefdoms" (Drennan and Uribe 1987). For what is now Ecuador, the corresponding temporal division has been labeled the Regional Developmental Period, generally dated from 300 B.C. to A.D. 600/800. It has been defined by its original presenters (Evans and Meggers 1960, 1961; Meggers 1966) as a time of increasing complexity, differentiation in sociopolitical organization, expanding trade and interregional contact, and florescence in local art styles which may represent regional chiefdoms. Very little is actually known, however, of the sequence of developments in Ecuador during this period. In particular, little attention has been paid to the Guangala Phase, which is our name for these localized cultures or art styles of the southwest coast.

Research on the Guangala Phase of the El Azúcar Valley (Figures 1-2) demonstrates that although the region's peoples may not have been the source of complexity, they participated in a dense web of interactions. This gave them access to highland raw materials and finished goods, marine resources, foreign pottery vessels, and certain decorative attributes (Masucci 1992; Reitz 1986, 1990a, 1990b; Masucci and Macfarlane 1997). Therefore, the El Azúcar Valley offers an opportunity to reconstruct the interactions which appear to have played a role in developments throughout the southwest coastal zone.

A fundamental element missing in our knowledge of the Guangala Phase and hindering research has been a detailed ceramic typology and chronology. However, one based primarily on modal changes in decorated fineware ceramics has been available (Paulsen 1970), along with a detailed study of the early portion of the phase (Stothert 1993a). My survey and excavations in the El Azúcar Valley, approximately 25 km from the present coastline, revealed deep, stratified midden deposits with large, well-preserved pottery samples of the Guangala Phase. These samples provide the opportunity for a ceramic analysis which tests previous studies and gives us a picture of complete assemblages from a wider span of the phase (Masucci 1992). I followed a combination of a type-variety and modal analysis (Robertson 1980, 1991; Demarest 1986). This paper outlines the chronological sequence resulting from these analyses. In it I present a set of temporally and spatially significant attributes of coarse-paste wares. This sequence of utilitarian wares allows sites to be placed into a series of complexes, even if fine- paste decorated wares are absent, or too eroded for identification.

This typological and chronological study has been further expanded through a technological analysis and sourcing study, utilizing methods borrowed from the geological sciences, particularly petrographic thin section analysis of pottery and regional clay and rock samples. Through examination of a complete assemblage, including both finewares and utilitarian wares, and use

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of an expanded methodology (type-variety-modal analysis) combined with a technological analysis, shifts previously documented in Guangala finewares were supported and found to coincide with changes in form, surface treatment, and paste composition in utilitarian wares. These changes also appear to correlate with changes in settlement.

Ceramic change is an issue which has been examined by many authors, and their work, whether ethnoarchaeological or archaeological, has demonstrated the variability and complexity of the relationship between ceramic change and changes in other elements of a sociocultural system (Rice 1984, 1987). Particularly complex is how contact with outside styles or symbols affects a ceramic vocabulary. Different variables of an assemblage, such as style, form, and technology, exhibit distinct levels of susceptibility to change. In general, technology and form are the most resistant to change, with style varying the most readily (Rice 1984:239-245). This assumption leads to an emphasis on stylistic change for building chronologies. Style is taken here to mean surface attributes commonly called decorative elements or modes. These can include shape attributes. Form refers to shape, specifically to size and other attributes of rims, lips, necks, bases, etc. It should be understood that these terms define related variables which, in turn, relate to paste characteristics as aspects of technical choices. As Rice has recently stressed, however, technical choices are not simply responses to desired performance, but rather are made in a "rich context of tradition, values, alternatives, and compromises" (1996:140). They demand an analysis that goes beyond the use of hypothesized functions to explain the causes of ceramic change.

In the El Azúcar case, changes in paste, forms, and surface treatment are useful for building a chronology because these variables are all seen to change, although at different times, rates, and to different degrees. The Guangala ceramic assemblage is diverse and complex and appears to encompass various trajectories of change, each of which may be attributable to different causal factors. Furthermore, identification of local and non-local pottery permits an assessment of possible contact between Guangala people and other neighboring groups. Such contact may have contributed to some of the changes. The majority of Guangala ceramics appear to have been made locally. However, transfer of stylistic modes and exchange of ceramic vessels are likely. Trade of tempering material is possible. The new body of data presented in this article leads to questions of production and function. It poses a range of questions about Guangala society and socioeconomic patterns.

Geographic and Cultural Setting

The temporal focus of this study is the Guangala Phase (300 B.C. to A.D. 800) (Paulsen 1970; Masucci 1992). This phase is identified as the localized art style or cultural manifestation of the Regional Developmental Period for southwest coastal Ecuador. Features typical of this phase include polychrome finewares, fine paste ceramic flutes, whistles, and figurines, and white-on-red painted pottery, including large thick-walled pedestal plates called *compoteras*. These features have been recorded over an estimated 8,000 square kilometers stretching along the Ecuadorian coast from Punta Arenas in the south to Machalilla in the north, and inland to the Guayas Basin (Figure 1; Bushnell 1951; Estrada 1957b, 1962; Meggers 1966; Paulsen 1970; Lippi 1983; Stothert 1984; Norton 1984).

The majority of ceramic and raw material samples considered in this study came from excavations in the El Azúcar River Valley, approximately 25 km up the Zapotal River from the port of Chanduy (Figure 1). The El Azúcar Valley lies in an ecotone between the lowland and upland zones on the western edge of the Santa Elena Peninsula. This region spans the transition from semi-arid zone dominated by xerophytic vegetation to dry tropical forest. Physiographically, the Santa Elena Peninsula

lies to the west of the Andean Chain, the Gulf of Guayaquil, and the Guayas Basin, and is separated from the wetter tropical areas to the north and east by the Chongón-Colonche hill range.

The Guangala Phase has always been assumed to have been a time when agriculturalists occupied nucleated settlements along the coastal margin, and more dispersed settlements throughout inland valleys (Meggers 1966). Charred remains of corn, beans, and squash were identified in a macrobotanical sample from the El Azúcar excavations (Pearsall 1990). My survey in the El Azúcar Valley (Figure 2; Masucci 1992) supports the picture of Guangala settlement patterns outlined by previous research (Lanning 1967; Paulsen 1970). During the early portion of this phase there was an expansion into inland valleys, with an increase in site size and number compared with the previous occupation of the valleys (ca. 100 B.C. to A.D. 100; Paulsen 1970; Stothert 1993a; Masucci 1992). Settlement expansion continued, reaching a climax in the middle portion of the phase (A.D. 100 to 600; Paulsen 1970; Masucci 1992). A form of mutualism between coastal and inland settlements may have played a part in this expansion, with marine resources a component in the economic system that supported it (Reitz 1990b). Evidence of the manufacture of marine shell beads and other ornaments is common at these sites (Masucci 1995), particularly at occupations dating to the middle portion of the Guangala Phase. The Early and Middle Guangala sites in the El Azúcar Valley follow a generally dispersed pattern. The majority of sites are on the first terraces above the flood plains. Most sites (86%, or 30 out of 35 Guangala sites) represent single farmsteads, to judge from the shallowness and limited areal and chronological range of deposits. More extensive sites with dense, deep midden deposits representing longer and more intensive occupation, or at least multiple households, are also present (9%, or 3 out of 35 Guangala sites; Figure 2). Two sites are shallow hilltop scatters which appear to date to the final portion of the Guangala phase. Three of the shallow midden sites also contain a late component.

The final portion of the phase (ca. A.D. 600 to 800; Paulsen 1970) represents a change in settlement pattern and type. Site location shifts to higher hills with access to wide expanses of flood plain. There is a drop in artifact density, an absence of a number of artifact types such as obsidian, and evidence of craft activities such as marine shell ornament production. Both marine shells and obsidian are nonlocal goods. A characteristic feature at these sites is an oval foundation (1.5 to 2.0 m diameter) formed by upright sandstone slabs and burnt clay floors and walls. Large grinding basins and fragments of large, thick-walled, coarse paste jars are typically associated with the features (Masucci 1992). Similar features have been reported since the 1930s and have been dated to the Late Guangala Phase or to the Manteño Phase (Zevallos Menénez 1937; Stothert 1981, 1993b; Masucci 1992, 1996; Alvarez Litben and García Caputi 1995).

Ceramics

Archaeologists in southwest Ecuador rarely have difficulty identifying ceramics of the Guangala Phase. The ubiquitous sherds with dark "finger-paint" decoration are an easily recognized marker. These sherds are assumed, however, to be chronologically insensitive beyond marking the phase. Only a few studies include descriptions of coarse paste or utilitarian vessels (Bischof 1982; Marcos 1970, 1982; Stothert 1993a). Instead, chronological and descriptive work has concentrated on decorated fine paste ceramics (Paulsen 1970; Simmons 1970). The lack of descriptions of the abundant plainwares and coarse paste utilitarian wares is particularly frustrating to archaeologists working at small rural sites where fine wares comprise a small percentage of the ceramic assemblage (Lippi 1980, 1983; Masucci 1992). In fact even at larger sites, decorated wares commonly represent less than five percent of an assemblage. Because of this emphasis on a limited portion of

the Guangala ceramic assemblage, trajectories of change have been well known for the fine decorated wares for some time, without a test of possible changes over time in coarse wares.

The terms utilitarian or coarse wares, as used here, follow definitions by Rice (1987: 203-204) and refer to the bulk of Guangala Phase ceramics which are of moderate to coarse pastes, and appear to be of low value and high consumption. This pottery contrasts with fine paste ceramics which are of lower frequency in the Guangala Phase collections. These are believed to have had high production cost, low consumption, and thus higher value (*Ibid.*:203-204).

Methodology

Typological and Chronological Methods

Many pages have been devoted to discussion of typological studies and the appropriateness of competing methods. The most reasonable statement made in this long-standing debate is that a single method or typological system may not be appropriate to every research situation. The most important factor in the choice of methods is to find one appropriate to the questions being asked and the material at hand (Brew 1946). The arena of Andean studies has its own particular controversy over the use of ceramic analytical methods (Rowe 1959; Lathrap 1962; Aleto 1988; Raymond 1995). Also, although reports concentrating on "cultural historical" questions such as building of local ceramic sequences are currently out of favor, there are still many Andean regions in which such basic studies remain to be completed. Therefore, because a single method acceptable to all analysts has not been presented, the questions of typological and chronological methods are still with us. One approach has been to choose of a combination of methods such as the call for a type-variety-modal analysis (Gifford 1976; Sabloff 1975) put into practice in studies in Mesoamerica by Demarest (1986), Robertson (1980, 1991), and Chase and Chase (1987) and with Mississippian ceramics by Steponaitis (1983). Ceramic analysts in Ecuador are also now productively adapting and reworking original definitions of modal analysis to fit particular collections and goals (Raymond 1995; Beckwith 1996).

A combination of Type-Variety, a typological/taxonomic hierarchical system of classification, and a Modal, or analytical classification, was chosen for this study as an approach well suited to its goals, the nature of Guangala ceramics, and the El Azúcar sample specifically. This combination was selected to provide the most information on coarse paste wares which are a substantial portion of Guangala assemblages and were particularly well preserved in the El Azúcar collection, while also providing comparative information to be used in conjunction with past studies using versions of modal analysis. A brief discussion of the definitions and possible strengths and weaknesses of type-variety and modal systems of classification are helpful for background on the selection of methods and results.

The type-variety-modal system as applied here to the El Azúcar sample is adapted from a series of recent studies (Demarest 1986; Robertson 1980, 1991; Steponaitis 1983) and original formulations of the methods such as Rouse (1939, 1953, 1960), Smith *et al.* (1960) and Sabloff and Smith (1969). In simple terms, the type-variety system aims at the creation of similarity classes of sherds and vessels to construct descriptive typologies, but more importantly, to delineate spatially and temporally significant units for defining intrasite and intra and interregional relationships and chronology. The goal is to define widely comparable historical-index classificatory units (Rice 1982: 48, 1987:282). Type-variety provides a view of large scale change as well as description of an entire collection and estimates of whole vessels.

The concept of mode has a longer history than the type-variety concept (Phillips 1970). Rouse's (1939) pioneering work is most commonly cited for the definition and discussion of

modes in ceramic analysis. Rowe (1959) and Lathrap (1962) became very strong proponents of the use of modes or features, proposing to do away with pottery types altogether (Phillips 1970). This tradition has been continued within South American ceramic studies (Menzel 1964, 1968; Paulsen 1970; Raymond *et al.* 1975; Isbell 1977; Mohr-Chávez 1977; Tolstoy and DeBoer 1989). Modes as defined by Rouse (1939, 1953, 1960) and contrasted to type were partitive; *i.e.*, a mode is an attribute or cluster of attributes that displays significance in its own right. Rouse (1960) shows in his definitions that mode and attribute are distinct but can be the same in practice. A mode consisted of a single design or technique used in the manufacture of artifacts, or else some specification (*e.g.*, hardness) (Rouse 1939:11). However, not every attribute indicated modes. Some are individual idiosyncrasies and modes are those attributes with historical significance. Modes, then, are attributes, or a series of attributes, with historical significance which are shared by corresponding parts of a series of artifacts (Rouse 1939, 1953:63, 1960).

Raymond's more recent application of this system which he terms a "Structural Analysis", does not appear to differ from fundamental definitions of modes as "values ranged along dimensions of variability, . . . assumed to be minimal units of formal variation which affect meaning" (1995:229). Modes, according to Raymond (*Ibid.*:229-230) may be defined as "discrete attributes (for example, an everted rim or a vertical rim), or as values along a continuous scale (such as mouth diameters)". However, Raymond also adds an explicit consideration of whole vessel categories. In describing the steps in a structural analysis he emphasizes that the "units that exhibit structure" are whole vessels. The unit of analysis is the complete vessel rather than the sherd (*Ibid.*:229-230). Raymond states that potsherds must be analyzed as parts of pots. This constant reference back to whole vessels can provide a meeting ground for the two methods. Therefore, in this study an attempt is made to use the systems as complementary rather than contradictory.

On the other hand, for the early typologists, types, as opposed to modes, were seen as more complex phenomena, difficult to duplicate and useful for broad-scale reconstruction (Rouse 1939:138-141). This view gave rise to a central criticism of type-based systems which continues today, with proponents of modal or feature analysis seeing their method as superior for fine-grained chronological analysis. Its followers stress the ability of the modal method to define short periods of time, or more discrete phase divisions, by considering the appearance and disappearance of individual attributes. Use of a composite entity or a grouping of a large number of attributes is considered counterproductive for fine-grained chronological analysis. Type-variety combines attributes into types with long life spans, creating chronologies of relatively few, very broad periods (Lippi 1980:131; Tolstoy and DeBoer 1989:299; Aleto 1988:106).

The actual validity of such statements in practice cannot be argued. In the case of the specific cultural phase of interest here, Guangala, an eight phase chronology was presented by Paulsen (1970) using a variation of a feature analysis rather than a type or type-variety method. The general scheme of that chronology is supported by the present study, i.e., that plain solid polypods appear earlier than decorated ones. However, as this study shows, the appearance and decline of these various features or modes is very complex, do not appear to occur all at once, often overlap for portions of the sequence, and therefore are difficult to use for dating sites with the precision that they promise. A classification system of types and varieties will not, however, do any better, but it does not promise that, noting the complexity of ceramic change.

Seen in the light of the above discussion, the two systems need not be competitive. They have both commonalities and fundamental differences, strengths, and weaknesses. Ulti-

mately, an analyst must apply the analytical structure best suited to the goals of the study and the nature and limits of a collection. Tolstoy and DeBoer (1989:299) assert that forms of modal analysis are best suited to relatively elaborate material and short-lived attributes, and can (with luck) extract chronological information from very small amounts of material. In addition, when working with eroded sherds, type-variety can be very time consuming with limited results (Sabloff 1975). A modal study can more easily deal with the attributes preserved in the sample. In addition, one major advantage of a modal analysis as defined and carried out by Raymond as a structural analysis is its predictive ability. With the understanding gained of the design elements and the "generative rules" of design one can predict which designs are "grammatically correct" (Raymond 1995:231). Therefore, it should be possible to recognize foreign pots, as well as copies and imitations of a style. Such sherds or vessels may have ended up hidden in a varietal description or in a box of "specials" or unknown sherds in a type-variety analysis. Although I did not follow Raymond's method specifically in this analysis, information on modes served a similar purpose, helping to highlight particular changes in the assemblage.

The Type-Variety method was therefore most applicable to the El Azúcar Guangala ceramics, but it did not serve well for all aspects of the collection. An attempt was thus made to apply a basic modal or attribute analysis following original definers of the system such as Rouse (1939, 1953, 1960) and analysts who have combined the methods (Robertson 1980, 1991; Demarest 1986). In practice this meant examining the collection for attributes or series of attributes which either cross-cut the types and varieties (whole vessel categories) defined in the analysis, or were subsumed within a type or were the defining characteristic for a variety. Not surprisingly, the modal analysis was most useful for the fine paste decorated wares and for defining a series of modes related to other contemporary cultural phases. However, it was not particularly revealing for coarse wares. The resulting type-variety classification offers a picture of broad changes over time in coarse ware surface treatment, form, and paste not previously delineated. The addition of a thin section analysis of pastes allows these pottery type descriptions to accurately define what is meant by a "coarse" vs. a "fine" textured ware. It also permits consideration of the relationship through time of style, form, and technology.

Ceramic Sample

Excavations of stratified midden deposits at two El Azúcar Guangala Phase sites provide the primary ceramic data base for the analyses. The ceramic sample is drawn from three trench excavations totaling 18 cubic meters. Two of the trenches are from one site (Figure 2, Site 47) with a third from a site 1 km distant (Site 30). Both sites contained only Guangala Phase material both on the surface and in excavated deposits. Excavations followed natural levels when present, and arbitrary levels of 10 cm when no natural divisions were visible. Deposits at Site 47 ranged from 160-180 cm in depth, and from 50-60 cm at site 30. One trench at Site 47 was enlarged by a 3 x 4 m areal excavation to offer a greater view of the artifact patterning within the site. Although the ceramics are not included in the analyses presented here, they were analyzed and followed the same patterns described in this article.

The well preserved state of the ceramics, the concentrations of articulated fish and deer bone, and the high number of partial vessels and sherd refits over short, primarily horizontal distances suggest minimal disturbance of the deposits. The density of material and the nature of the artifacts, such as the range of ceramic forms, vertebrate and invertebrate faunal, macrobotanical, and lithic remains, both tools and manufacturing debris, as well as wattle-and-daub, metal artifacts, debris from shell working, pyrolized plant remains including cotton (Pearsall 1990), spindle whorls, a living floor, hearths, and ash throws, possibly from hearth sweepings,

all support an assessment of the deposits as domestic midden from a sedentary farming homestead. The size, density, and extent of the midden deposits at the two sites suggest trash from multiple households. Occupation also appears to have been continuous because no sterile layers were observed dividing the midden.

Five Guangala sites recorded in the El Azúcar survey contained ceramic types not found at any other Guangala sites in the Valley. These five sites were identified as Guangala based on the presence of pedestal plates (*compoteras*), which are markers of the phase, and of fineware jars with vertical necks, lip flanges, and appliqué decoration associated in other studies with the final portion of the Guangala Phase (Paulsen 1970). The ceramic assemblages were dominated by sherds from two types of large, thick-walled, coarse paste jars which also are associated in previous studies with the Late Guangala or Manteño Phases (Bushnell 1951; Estrada 1957a, 1962; Simmons 1970:385-388; Lippi 1980: 70; Mester 1990:148-150; Stothert 1981, 1993b). The utilitarian ware ceramics from these sites were used to define two types marking the final portion of the phase (Masucci 1992: 371-375, 1996).

A total of 28,000 sherds from excavated contexts were analyzed. All excavated sherds were sorted into types following the type-variety system (Gifford 1976; Robertson 1980; Smith *et al.* 1960). Types were defined primarily on attributes of surface treatment and decoration with additional consideration of form and visible paste characteristics. All sherds were then coded for modes present and entered as separate cases into a computer data base so that temporal variations in attributes which crosscut types could be examined.

The combination of methods was well-suited to the El Azúcar sample and research goals. The large, well preserved sherds from the El Azúcar sample included a high number of partial vessels, primarily plainwares, or coarse paste wares. The type-variety system has identified temporal patterns of change in plainwares and utilitarian pottery in other areas (Robertson 1980). Through the type-variety system the "complete" assemblage: body sherds, as well as rims, and unslipped, as well as slipped and decorated pottery, could be analyzed and described. A type is not valid unless all portions of a vessel are represented.

Sixteen types and 31 varieties have been established for this Guangala assemblage. The types were examined for temporal and spatial significance through a relative frequency seriation in conjunction with stratigraphic analysis of the midden deposits. Nonmetric multidimensional scaling was used to examine the variability present in the collections and test the validity of the seriation, as well as help suggest interdigitation of the three trench samples and subdivision of the resulting sequence (Masucci 1992).

The modes examined were divided into formal, painted, and plastic attribute combinations. These modes did not suggest either an independent subdivision of the Guangala sequence or a finer subdivision than that proposed on the basis of type frequency seriation. The results instead offer a set of additional distinguishing criteria for the chronological divisions which will be particularly useful to analysts working with surface collections where type frequencies cannot be calculated. This is a particularly important point because type-variety has been criticized for offering only large-scale historical units which assume gradual change. The use of both typology and the results of modal analysis does allow finer temporal assessment of collections because some types overlap in occurrence and some show only minor changes throughout the entire sequence.

Technological Analysis

Following completion of the typological and chronological study a technological analysis was undertaken to investigate possible changes in vessel paste through time, and the correlation

between stylistic and formal attributes and technological attributes. The pastes used in an assemblage can be analyzed by looking solely at ceramic artifacts. However, if there is an interest in the manipulation of raw materials and in questions of provenance, the analyst must gain knowledge of locally available resources. Provenance studies in particular require comparison of ceramic artifacts with locally available raw materials.

Two geological mapping and sample collection expeditions were conducted in Ecuador from 1992 through 1993 (Masucci and Macfarlane 1997). Analysis of the samples provides data on the local geological setting and on the resources available. This information served as the basis for provenance and technological analysis. A total of 53 clays and 28 rock samples were prepared as thin sections. Thin sections were also made of 180 Guangala pottery sherds and three Early Manteño sherds. Of the ceramic sample, 93 sherds are from the El Azúcar excavated collections. The remainder of the sample is from surface collections made in the El Azúcar Valley, and at sites outside it which were encountered during geological survey, or were provided from excavated or surface collections by other researchers working in southwest coastal Ecuador (Figure 1). The ceramics were selected to cover surface treatment and the form and composition groupings noted in typological and chronological analyses. Using techniques of optical petrography (Pettijohn 1975; Whitbread 1987, 1989; Folk 1974), observations were recorded on attributes of micromass, microstructure, composition, and texture (Masucci 1995; Masucci and Macfarlane 1997). Estimates of quantitative variables were based on published geological comparative charts (Folk 1974; Pettijohn 1975). Petrographic analysis treats pottery as a geological material. Its techniques are used to identify mineral and rock fragments, as well as to examine attributes of the clay matrix. On the basis of the recorded characteristics, the thin sections are grouped in fabric classes. These groups must then be interpreted through comparison with typological and chronological orderings based on attributes of style and form.

Results: A New Local Sequence

The El Azúcar analysis revealed patterns of change in fine paste ceramics which support previous work by other authors (Paulsen 1970; Simmons 1970; Stothert 1993a). In addition, the work revealed a series of changes in coarse wares not previously discussed. Results of the analysis showed that not all Guangala Phase finger-painted vessels are created equal and that they are, in fact, chronologically sensitive. By concentrating on attributes of surface treatment, paste composition, and form, a series of chronologically and spatially significant utilitarian ceramic types has been defined. This pattern of changes has been used to subdivide the Guangala phase, as represented at El Azúcar, into three ceramic complexes (Complexes I-III) which correspond generally to the Early, Middle, and Late Guangala (Stothert 1993a; Paulsen 1970). Only a summary of the primary types and forms is presented below, and a summary of forms is illustrated in Figure 3. Detailed descriptions are available elsewhere (Masucci 1992).

A series of corrected and uncalibrated radiocarbon dates from the primary trench of Site 47 (X Trench) provide an absolute scale for the ceramic chronology (Masucci 1992:table 10). Three radiocarbon dates from the deposits place Complex I between 2030 ± 120 B.P., 1850 ± 70 B.P., and 1750 ± 60 B.P. (Table 1). Only one radiocarbon assay is available for Complex II. It suggests a position on the continuum between 1750 ± 60 B.P. and 1670 ± 60 B.P. with no ending date available. No dateable materials are available for Complex III, but on the basis of cross-dating with previous studies (Paulsen 1970), the types present correspond to what has been labeled "Late Guangala" spanning the period from 1350 to 1150 B.P.

Table 1. El Azúcar Site 47 radiocarbon dates

Provenience	*Corrected, calibrated*	*Corrected, uncalibrated*	*Laboratory number*	*Sample material*	*C13/C12 ratio*
Complex 1					
X Trench					
70-80 cm b.s.	280 ± 85 A.D.	1750 ± 60 B.P.	SMU 2461	Wood charcoal	δ13/12C = -25.3‰
105-110 cm b.s.	150 ± 90 A.D.	1850 ± 70 B.P.	SMU 2463	Wood charcoal	δ13/12C = -25.4‰
X Trench					
140-145 cm b.s.	60 ± 150 B.C.	2030 ± 120 B.P.	SMU 2462	Wood charcoal	δ13/12C = -25‰
Complex II					
X Trench					
20-30 cm b.s.	370 ± 80 A.D.	1670 ± 60 B.P.	SMU 2460	Wood charcoal	δ13/12C = -24.6‰

Typological and Chronological Analysis

Complex I. The earliest ceramics present in the El Azúcar deposits (Complex I) are dominated by two related vessel types with "finger-painted" decoration (Figures 3-6). Both types consist of thin to moderately thin walled vessels (0.5-0.7 cm). One is characterized by an unslipped exterior and finger-paint decoration, and the other by a thin, watery red-slipped exterior and finger-paint decoration. Predominant forms are round-bottomed, flaring collared jars with a sharp, defined throat angle and a range of rim and lip forms. Rim diameter range is 6.0-46.0 cm. These two types together comprise from forty to seventy percent of the pottery recovered in the lowest levels of all deposits.

Open forms of similar paste and wall thickness are primarily flaring walled bowls supported with polypod legs and a range of rim and lip forms. The lowest levels of the deposits contain only plain, undecorated solid or hollow polypods, but solid pods with elaborate applique decoration depicting human figures and animals occur during Complex I, although slightly later than plain pods (Figure 8). Paulsen has presented a chronology of changes in the features of these polypods (Paulsen 1970), but these features were found to overlap in the stratigraphic columns at El Azúcar.

Primary modes are finger-painted decoration, Appliqué on bowl leg supports, and a combination of zoned incision, punctates, and appliqué circles on the exterior shoulder of a small number of jars. This latter mode is very rare in the El Azúcar assemblage and crosscuts forms and types of utilitarian wares (Figure 9). The combination of decorative elements is distinctive and described as typical of the Jambelí Phase in southern Ecuador. A pottery type with this mode is listed by Estrada *et al.* (1964) as "Jambelí Punctate." The occurrence of this mode is limited in the El Azúcar sample to the earliest levels of Complex I. Stothert has described the occurrence of the same suite of decorations on vessels at Valdivia Village, an Early Guangala component (1993a).

Fine paste ceramics are dominated by thin walled (0.2-0.7 cm) bowls and dishes of complex shapes with thick, dark glossy slips and burnished line decoration occurring on matte unburnished areas on either the interior or basal exterior portions of vessels (Figures 4 and 10). Iridescent painting is also common on these vessels in a range of simple dot and band motifs (Figures 4 and 10). These vessels are well documented in literature on the Guangala Phase (Willey 1971; Meggers 1966; Paulsen 1970; Simmons 1970; Stothert 1993a). A round bottomed, carinated jar with outcurving rim and

rounded or pointed lip is also present with this same suite of decoration.

Simple contour, moderately thin direct walled (0.4-0.6 cm), hemispherical bowls and ring-based plates with red slip and often fugitive white paint are also present (Figures 3, 4, and 9). Previous work listed these vessels as markers of Early Guangala (Paulsen 1970). At El Azúcar they are found primarily in Complex I, but do continue during Complex II. These vessels, along with thick-walled (1.0-2.0 cm) plates (*compoteras*) on high pedestals with thick red slips and white painted decorations, are seen as important markers for the Regional Developmental Period (Figure 3). At El Azúcar the *compoteras* are found in low frequencies throughout the phase. *Compoteras* bear a range of decorative modes including appliqué balls, cutouts, and incisions, but these often appear only once in the assemblage on a single vessel. Strikingly similar vessels to both of these types with white and red slip decoration have been noted from as far south as the Tumbes Valley in northern coastal Peru (Izumi and Terrada 1966).

Complex II. Coinciding with the first appearance of bichrome and polychrome fine paste ceramics (Figure 3) is a new set of types in coarse paste wares. These types appear initially in low frequencies at the same time that vessels of Complex I show a decrease in frequency (Figure 7). The new set of coarse ware types comes to replace Complex I utilitarian vessels completely, and together comprises from 45% to 65% of the pottery recovered in upper levels of all deposits. The Complex II ceramics are dominated by large, thick-walled (0.7-1.0 cm) jars bearing either a thick, dark red slip with finger-paint decoration or an unburnished, watery exterior slip with coarse wiping marks and occasional finger-paint decoration (Figures 4, 5, 11). These types exhibit an easily distinguishable new range of forms dominated by round-bottomed jars with outcurving necks and curved throat angles and a range of rim and lip forms.

Polypod vessels are still present. However, the dominant open forms are flaring walled bowls and large, round-bottomed bowls with slightly incurving sides, thick red-slipped interior surfaces, and very rough exteriors. Finger-painting on these vessels commonly appears over the red slip (Figure 11).

Finewares are marked by geometric designs in dark brown or red paint over a light-colored slip, producing either two-colored (Figure 12) or three-colored wares (Figure 12), commonly referred to as bichromes or polychromes. These vessels are thin walled (0.2-0.6 cm) shoulder bowls with simple contours, almost vertical-sided, with slight carinations, direct rims, and rounded lips. A wide range of motifs have been described for coastal sites, including zoomorphic designs. Most notable is a pelican motif (Bushnell 1951; Paulsen 1970). Zoomorphic designs were absent at the inland El Azúcar sites.

Complex III. Based on radiocarbon dates and comparisons with previous work (Paulsen 1970) the excavated midden deposits analyzed in this study do not encompass the entire Guangala phase. However, surface collections at five El Azúcar sites suggest a third complex. Site collections contain sherds identifiable as Guangala, but the assemblages are dominated by unslipped, undecorated sherds from large coarse paste jars not observed in the excavated samples (Figure 13).

Recent surveys in the Río Grande Valley immediately to the northeast of the El Azúcar Valley have provided larger and better preserved samples of the coarse ware types typical of these sites (Masucci 1996). Two types are present. Type 1 is a thick walled jar (0.7-1.7 cm; Figures 3, 13) with large, extremely thick, exterior folded or rolled rims (38-46 cm diameter) and unslipped, roughly finished exterior surfaces with deep pits caused by dragging large coarse inclusions across the vessel surface (Masucci 1992:371-375). Type 2 also has thick walls (1.0-2.0 cm) with high, flaring, direct or slightly incurved rims (40-54 cm diameter) and

a smoothed exterior surface. Neither type shows evidence of burning.

Fine paste, moderately thin walled (0.5-0.8 cm), vertical necked jars with lip flanges and highly polished exterior surfaces were also present at these sites (Figures 3, 13). This form is not present in the excavated samples and is found in surface collections only at the five Complex III sites of the El Azúcar survey. This form is similar to that listed in previous studies as "Frogware" because of the presence of applique clay circles on the jar shoulder arranged in the form of a frog (Paulsen 1970). Variations of this type are dated by Paulsen to the latter portion of the phase. A second form of red-slipped, fine-paste jar often associated with Manteño is present with what is referred to as a "bell-rim", a high, outflaring rim (Figure 13, Bushnell 1951).

Summary of Typological and Chronological Analysis

Three trajectories of change were discerned in the Guangala assemblage. These involved finewares, utilitarian wares, and a third set of vessels with white- and red- slipped decoration (Figure 3). The dramatic shifts in the style of finewares have been presented in previous studies (Paulsen 1970; Simmons 1970; Stothert 1993a). Similar changes were observed at El Azúcar and are illustrated in the left column of Figure 3. These types, based on formal and wall thickness changes, are identifiable even in eroded samples. Changes not previously outlined also occur, in the style and form of utilitarian wares. These correlate with changes in the finewares. The changes are illustrated in the right column of Figure 3. These can be discerned in eroded samples by taking into account attributes of paste, form, and wall thickness.

Frequency seriation of these types, particularly the utilitarian wares, and modal analysis, particularly of the finewares, were the basis for delineation of three chronological groups, Complexes I-III. The utilitarian wares were more useful in chronological studies using frequency seriation because the finewares represented such a small percentage of the overall sample, and changes in frequency were not statistically significant. Figure 7 (top) illustrates the shift in frequencies of utilitarian wares and finewares between Complex I and II in the primary trench at Site 47.

A third set of ceramic types with a distinct trajectory of change was discerned in the assemblage. These types are shown in the center column of Figure 3. The types encompass the large, thick-walled pedestal plates with white and red slip-painted decoration and hemispherical bowls as well as small pedestal plates which show strong stylistic affinities to cultural phases to the south. The white-on-red bowls and plates have their primary occurrence in Complex I, but are also present in Complex II with no detectable changes in style or form. Large pedestal plates are present throughout the entire sequence with no detectable change, although there is always a wide range of variability in forms and surface decoration.

Technological Analysis

Complex I. The utilitarian wares of Complex I group into a related fabric class. Based on comparison and correlation with raw materials sampled within 10 km of the El Azúcar Valley, the ceramics could be termed "local" products (Masucci and Macfarlane 1997). Due to the rare evidence of on-site pottery production and the general uniformity of raw materials in the immediate Santa Elena area, it is not clear, however, if the pottery was actually made at the find sites. Therefore the term "local" pottery is used to signify ceramics made within the Santa Elena area.

A similar case for Valdivia pottery has been reported by Marcos (personal communication 1995). Ceramic pastes correlate with the Quaternary vertisols found directly on or near the surface throughout the area. Modern potters in such villages as Río Verde, Buena Fuente, and

Juntas use similar deposits, and samples of their clays match well with the utilitarian wares of El Azúcar Complex I.

The fabrics of utilitarian vessels of Complex I which bear designs matching those typical of the Jambelí Phase also fall into the fabric class of the other early utilitarian wares. Therefore, these vessels represent an incorporation of decorative attributes from neighboring cultural phases into locally made Guangala pots. There are no other attributes of form or surface treatment which would place these vessels outside the range of typical Guangala wares.

The finewares of Complex I group into a homogenous fabric class which, with two exceptions, matches local clays. First, the texture of the ceramic fabrics is distinct from that of local raw materials. Texture could be altered by refining local materials such as through wet or dry sieving. Second, pumice fragments are a predominant non-plastic inclusion. This rock type has not been found in local clays, rock outcrops, or drainage float materials. The Ecuadorian highlands have substantial deposits of pumice that are mined today and sent to the coast. Although not listed on geological maps, there may be deposits in the Chongón-Colonche hills, but these most likely would be of tephra, a mix of pyroclastic materials from volcanic eruptions. The inclusions in the El Azúcar ceramics are pumice only.

Vessels with white- and red-slipped decoration are unusual in their mineralogy, texture, and technology compared to local materials and the remainder of the El Azúcar sample. The white-on-red hemispherical bowls and ring-based plates form a separate pottery class and do not relate closely to any of the raw materials sampled thus far in the area. Furthermore, the vessels show a strong preferred orientation of voids. This patterning may be associated with forming methods (Whitbread 1987, 1989; Woods 1984-1985). The pattern was not observed in any other types, even when a similar form was present.

Compotera vessels also are unique, but with the exception of pumice temper, the mineralogy reflects that of local materials. The samples formed, however, a very heterogeneous class with a wide range of variation in non-plastic inclusions, particularly tempers such as grog (ground pottery) and pumice. Based on mineralogy, these could be local products, but each may have been made at a different production site, or by a different potter.

Complex II. The utilitarian wares of Complex II also form a closely related group on the basis of mineralogy and texture, but one which is very distinct from that of Complexes I and III. Texture is characterized by a bi-modal distribution of inclusions. The smaller size mode is comprised of fine sand-sized grains of quartz and feldspar, similar to those observed in the local clays. The larger size mode is also comprised of locally available material, coarse to very coarse sand-sized sub-rounded chert and tuff fragments commonly found in the local drainages. This suggests the use of local clays with temper selected from local river sands. Therefore, these vessels are likely local products, but technologically they are distinct from Complex I types which appear to have been formed from local clays with little manipulation or tempering. Finewares and white and red vessels show no change from Complex I.

Complex III. Type 1 of Complex III utilitarian wares, in contrast to those of Complex I and II, does not appear to be a local product. The fabrics of these vessels are dominated by coarse sand-to-granule-sized grains of eroded coarse-grained igneous rocks. This class of material or granodiorite is not available in the immediate area of El Azúcar or the Santa Elena Area. Small outcrops occur in the northeastern Chongón-Colonche hills north of Guayaquil, approximately 70 km from El Azúcar. In 1996 these rock formations were examined, and thin sections of samples analyzed (Masucci 1996). A common identity was confirmed, but chemical analyses are necessary to confirm a common source. Type 2, on the other hand, is similar in

paste, although different in form, from earlier Complex I utilitarian wares, utilizing local materials with little alteration. Finewares and *compoteras* show no change from Complexes I and II.

Summary of Technological Analysis

Technological analyses revealed a variety of relationships between stylistic and typological analyses and paste characteristics. For utilitarian wares, there is a strong correlation between surface treatment and shape with paste. Specifically, the shifts in style defining Complex I and Complex II types correspond to a shift in paste.

In contrast, paste characteristics of finewares did not change throughout the Guangala Phase even though significant changes occurred in style. In the case of *compoteras*, a type was defined on the basis of common form, although there is a wide range of variation in decoration, and technological analysis showed heterogenous pastes. Vessel types with white and red decoration remained stable in all attributes across the phase.

The utilitarian wares of Complexes I and II appear to be local products, although made of different raw materials. Complex II types contain local tempers used to produce vessels very distinct in wall thickness, form, and surface treatment from Complex I. Complex III utilitarian wares, however, are both local and nonlocal. One type contains rock fragments which have not been found in the El Azúcar or Santa Elena areas. Throughout the phase finewares appear to have been made of locally available, refined clays tempered by non-locally available pumice.

The picture is distinct for vessels with white- and red-slipped decoration (Figures 3, 9). Although these are commonly viewed as key Guangala markers, they are likely non-local products. In an early study of Guangala ceramics Bushnell (1951) suggested that the white-on-red hemispherical bowls were imported from the South. He based this idea on the visible micaceous inclusions extruding onto the surfaces of the vessels. Bushnell did not believe that this type of mineral was present as a natural resource in the area, or occurred in other vessel pastes. We now know, from analysis of local clays, that both muscovite and biotite are present in raw materials in the region, but are rare mineral types occurring as fine-sized inclusions (<.05 mm). In contrast, these minerals are common and are larger (0.1-0.5 mm) in the white-on-red ceramics. Therefore, Bushnell's hypothesis may be correct. These vessels are distinct in terms of texture, mineralogical composition, and technology. Thin sections from three sherds of almost identical form and decoration from the site of Los Vergeles in Arenillas, El Oro Province south of El Azúcar, and within the area defined for the Jambelí Phase, have also been examined. These sherds were similar in texture and mineralogy, and showed the preferred orientation of voids typical of the El Azúcar white-on-red samples. Chemical studies using Neutron Activation Analysis of these samples were conducted by Hector Neff at the University of Missouri Research Reactor (MURR) to examine further the relationship between these sherds. Preliminary results cluster the El Azúcar white-on-red samples with those from El Oro, but raw materials from this southern province have not yet been tested (Masucci and Neff 1997). These results are being prepared for publication. It also remains to be demonstrated that the Los Vergeles samples are themselves local. Nevertheless, preliminary results strengthen the likelihood of a relationship between the southwest coastal peoples and those further to the south. This interaction likely extended into far northern Peru. Evidence is the strong formal and stylistic similarities of white-on-red types and *compoteras* among Guangala, Jambelí (Estrada *et al.* 1964: plate 12), and Garbanzal (Izumi and Terrada (1966: plates 13 and 15). Furthermore, it is interesting to note that these white-on-red vessels, which may be related to southern groups, are most common in Complex I and coincident with the occurrence of the Guangala vessels bearing "Jambelí Punctate" type decorative modes.

The large pedestaled plate vessels or *compoteras* have proven to be an enigma in terms of technological attributes. These vessels show a remarkable diversity in traits, with no two samples alike. The samples do not, however, fall into any other fabric group. The characteristics observed in these samples appear to be a mix of all the Guangala types. Technological diversity could be used as a basis for suggesting a range of proveniences for these vessels. The wide range of attributes which characterize these pastes are all within the Guangala production repertoire, and thus these vessels could simply represent an attempt to temper with whatever is commonly used or available to achieve the thick walls typical of these vessels. It is also useful to note, however, the evidence for ceramic production found by Stothert at sites in the Las Balsas region north of El Azúcar. Survey at sites there also indicated a high percentage of *compotera* sherds (Stothert 1993b).

Thin sections of stylistically similar sherds from other Guangala sites in the southwest coastal region were compared with the samples from El Azúcar. These additional samples exhibited characteristics which strongly correlated with the fabric classes discerned in the El Azúcar sample. Therefore, these technological classes appear to be consistent throughout the Santa Elena area (Masucci and Macfarlane 1997).

Discussion

Correlation of the results of the typological, modal, and technological analyses distinguishes main classes of ceramics in the Guangala assemblage with three distinct trajectories of change (Figure 3). Ceramic typological studies can mask such diversity, emphasizing common patterns of change across ceramic classes useful for subdividing cultural periods. The main advance from the combination of methods used here is that it moves analysis beyond documentation of artifact variability. It provides data on what changed. It is proposed that the nature of the variability is significant and useful for pursuing an explanation for the changes. The following discussion is organized by these three classes.

Furthermore, the results suggest a necessary questioning of the temporal-spatial "culture phase" divisions we have created and continue to use. As this research emphasizes, "Guangala" ceramics exhibit major changes in all aspects of the assemblage - in the decoration and form of finewares, as well as in the surface treatments, forms, and pastes of coarse paste wares. Change in finewares is very abrupt, with only technology retained from earlier wares. What holds the "phase" together, then, is only a general level of similarity, including finger-painted decoration, "red" globular cooking jars, pattern burnish decoration, and the continued occurrence of pedestal plates and white-on-red bowls and plates. These two latter types may, however, actually be special function ritual vessels with white-on-red vessels imported.

Fine Paste Wares

New stylistic traditions were incorporated into this class of wares during the Guangala Phase, although there is continuity in raw material use and technology. Therefore, fine paste wares exhibit stylistic change alongside technological stability. Also, within each complex, there is a narrow range of stylistic and technological variation. These vessels appear to be local products but contain pumice temper, a non-locally available material. Importation of this material during the Guangala Phase would add to evidence of movement of goods, such as obsidian, from the highlands to the coast (Burger *et al.* 1994). The compositional similarity between fineware vessels in each complex raises the possibility of centralized or specialized production of these wares, but this is difficult to address with petrography alone. Chemical analyses have been performed to address this issue. Preliminary results do not support a model of centralized production. Further, the likely source of production for individual samples did not always correspond with their archaeology provenience, suggesting groups may

have exchanged individual vessels (Masucci and Neff 1997).

It is not surprising that the technological attributes for manufacture of Guangala fineware pastes would remain stable throughout the phase, because, whether applying a burnished or painted decoration, the desire for a thin-walled vessel with well-fired, dense paste was constant. What was affected in the finewares were the visible features, assumed to be the symbolically significant or ideologically loaded elements which may have signaled something about Guangala shared identity. The source of this new decorative style is still not known, but the multi-colored painted decoration which appears in Complex II is a break with the previous fineware modes which were related to a stylistic vocabulary with roots in the Late Formative. Ledergerber (1980) also has shown similarities in design elements between Guangala pattern burnishing and that on sherds from the Nasca Phase at the site of Cahuachi, in Peru's Nazca Valley. The form changes which occur do not alter the likely function of the fineware vessels as serving or presentation pieces. Therefore, it seems probable that, on one level, the function of these vessels did not change. The message, or its destination may, however, have changed. In addition, any social processes responsible for the shift of Complex I black-burnished finewares to polychrome-painted finewares of Complex II did not affect the availability of the raw materials, specifically pumice, which were part of the fineware production tradition.

Another issue regarding these wares is the use of the label "elite wares", based mainly on estimated greater effort required for manufacture (Stothert 1984). Could these wares indicate the presence of elites or social hierarchies during the Guangala Phase? The vessels do have higher production costs because of their decoration and the control of firing necessary to produce multiple colors. The creation of high-status goods, or the control of luxury items as an aspect of competitive hierarchical societies in the Intermediate Area is well documented (Drennan and Uribe 1987; Helms 1987). Ethnohistoric evidence from Ecuador also shows an association of finely decorated vessels with native nobles (Salomon 1986:124). Contemporary groups in the Eastern lowlands of Ecuador, however, have a polychrome tradition associated with ritual and gift giving, rather than display of elite status (Kelley and Orr 1976; Whitten 1975). Also, in the case of the Sarayacu Quichua, similar painting techniques are used, but each potter has a distinctive style of decorative designs (Kelley and Orr 1976:17). These few examples indicate that both the degree of standardization in decoration, as well as context, are key evidence for examining the production, function, and use of such vessels. Contextual data from El Azúcar indicate that the vessels are widely available, and not limited to certain site types or sizes. Not all motifs, however, may be present at all sites. The often pictured zoomorphic designs (Paulsen 1970) from pottery found at large coastal sites, such as La Libertad, were absent from the El Azúcar inland valley sites. Detailed design analysis has not been performed for these wares beyond Paulsen's (1970) attempt to document evolution of the style for chronological purposes. Much more detailed contextual data, information on distribution of motifs, and delineation of production organization is needed before the question of the significance and function of these wares can be addressed.

Coarse Paste Wares

Coarse paste wares were essentially reinvented during both Complexes II and III, employing new technical choices to produce different shapes and styles. Complex I utilitarian wares show strong affinities to Late Formative ceramics, as do the finewares. The changes in Complex II show a preference for a vessel produced with larger and different inclusions, thicker walls, and more friable paste. This change requires the addition of production steps in the use of a local raw material for tempering, and in the application of exterior thick red slip. There is also an increase in the size and depth of

bowl forms in Complex II. The shift seen in Complex III utilitarian wares suggests a much more complete break with the early and middle types because one type of vessel is most likely not made of locally available materials. Changes in utilitarian wares in both Complexes II and III also occur within a context of settlement change. Settlement expansion and population increase through Complex II have been proposed. Complex III or Late Guangala has been seen as a time of settlement disruption and possible abandonment (Lanning 1967).

The shifts in utilitarian wares would seem to suggest changes in function, particularly when correlated with the changes in settlement. Not all form characteristics, however, are related to use. Many can be stylistic (Crown 1981). Porosity tests following Rice (1984:350-354) also show that all types cover the same range of 20-30% porosity even though paste, wall thickness, and surface treatment varies. Burn patterns, on the other hand, do vary between Complexes I and II, and Complex III vessels have no evidence of burning. The sample of Complex III sherds is, however, still very limited. This suggests the possibility of change in cooking methods, for example, suspension over a fire versus pots set into a hearth. Such different cooking methods have been shown to result in different burn patterns on vessel surfaces (Robertson 1980; Hally 1983, 1986). Analysis of vessel size, volume, and burn patterns on the El Azúcar samples continues in order to confirm these possible correlations. The function of the addition of a slip, increased wall thickness, and other attributes to counteract thermal shock and other problems should be addressed.

Changes in paste could have been forced by exhaustion of local materials. This does not seem likely, however, because vessels of pastes typical of Complex I continue in very low frequencies throughout the sequence, and finewares are likely produced of similar, although more refined, materials. Also, the pastes of Type 2 of Complex III are related to those of Complex I. Results of chemical analyses should be particularly useful for explaining changes seen in Complex III coarse wares. Based on the similarity to mineral types available to the east in the Guayas Basin (Masucci 1996), it is possible that the changes in ceramics and settlement relate to events or peoples in that area. Currently only a correlation of raw material type has been established, a common source must still be demonstrated. Relationships with the Guayas Basin would not be a surprise and have long been assumed (Estrada 1957b), but demonstration through sourcing studies would be useful for better defining these interactions.

White-on-red

Finally, the uniqueness of the pastes of vessels with white-on-red painted decoration suggests a special case (Figures 4, 9). These types are present in low to moderate frequencies and show few, or only subtle changes in style or paste throughout the entire phase. Based on composition, the pedestaled *compotera* vessels could have been made locally, but show a remarkable diversity in technology and decoration, with each vessel seeming unique. The form of these vessels and their similarity to later stone seats, has led to an inference of use as seats, or display receptacles for offerings (Bushnell 1951). In contrast, white-on-red hemispherical bowls and ring-based plates appear to be nonlocal and possibly related to groups to the south. The likelihood of such interaction with southerly groups is strengthened by the identification of Jambelí modes on local Complex I Guangala vessels.

The particular forms and styles of these vessels date to the Late Formative and are found from northern Peru through southern highland and coastal Ecuador. Marcos (1986:37-38) has offered a scenario for the spread of these characteristic Regional Developmental Period traits (*e.g.*, clay seats, white-on-red paint decoration). His model is based on trade, competition, and conflict. According to Marcos, the appearance of the cultural phases of the period is attributed to a net of exchange based in traffic of *Spondylus*

sp. which served to create a series of *jefaturas y clanes* (chiefdoms and kin groups/clans). These groups or cultural phases were in competition to control or expand control of a sphere of influence in the net of long distance trade centered on the exchange of *Spondylus* shell. Changes wrought are due to incursions into the coastal area by *mercerderes* (merchants) from Cerro Narrío in the southern Ecuadorian highlands looking to expand and gain greater control in redistribution of the precious *Spondylus* shell. This model does not specifically discuss the use of these vessels or why they would have been imported or their styles adopted.

The possible non-local production of the white-on-red vessels could be seen as supporting Marcos' model. However, the vessels and other Early Guangala traits appear to be more closely related to southern coastal Ecuador and northern Peru, than to the southern highlands of Ecuador. The general hypothesis that the appearance of these vessels relates to interregional contact is very likely, however, given the results presented here.

The new information provided through this study on the white-on-red decorated vessels raises more specific issues of the use and significance of this class of vessels, the meaning of style, the origin of changes which we label Guangala, and finally, the particular relationship of the Guangala people with their neighbors in southern Ecuador and northern Peru. The technological analysis, in particular, indicates that the two types of vessels have very different production histories and therefore may not have moved or worked as a unit. Although, if white-on-red vessels were imported from the south to be used at sites, and *compoteras* were made at a number of sites and then circulated, both types would seem to have had a related importance in terms of inter- as well as intra-regional relationships.

Conclusion

The research reported here demonstrates the potential of examining complete assemblages and employing a range of analytic methods. Through this combination of analytical methods and the inclusion of rarely studied coarse, utilitarian wares, new information on chronology, production, and ceramic sourcing for the Guangala Phase of Southwest Ecuador (ca. 100 B.C. to A.D. 800) was obtained. Specifically, a combination of type-variety, modal, and petrographic thin section analyses resulted in not only the definition of chronologically significant ceramic attributes, but also revealed the complexity of ceramic change during this period. Changes occurred at different rates and in different attribute classes and at times correlated with changes in settlement. Radiocarbon dates provide absolute time markers for the changes.

The study has methodological significance for ceramic analysts due to the combination of often-competing analytical approaches with technological analyses, as well as cultural significance for the opportunity to reconstruct the complex web of interactions which moved goods and ideas through the Andean area. This web was likely both a source and result of sociopolitical change during this period. This work represents an initial move beyond simply documenting ceramic change, to building hypotheses to explain change and define the relationship between ceramic change and culture change. Also, as new information on settlements, site functions, and artifact contexts becomes available for Guangala and its contemporaneous cultures, we will be better able to employ the detailed ceramic data presented here to understand technological choices, intra- and intergroup interaction, and culture change.

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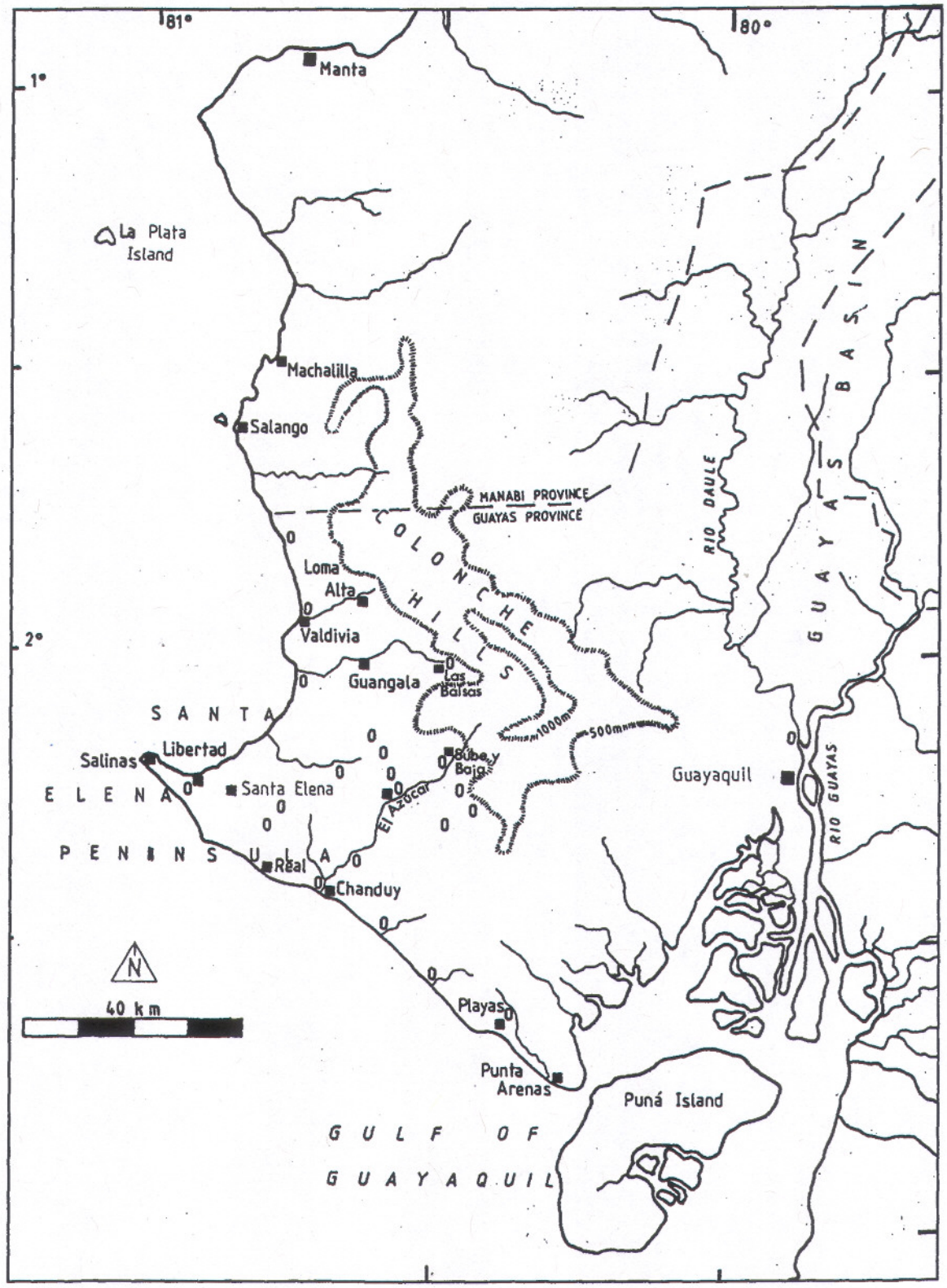

Figure 1. Southwest Ecuador. Open black circles mark raw material sampling locations. The El Azúcar Valley lies north of the coastal town of Chanduy (after Masucci 1992).

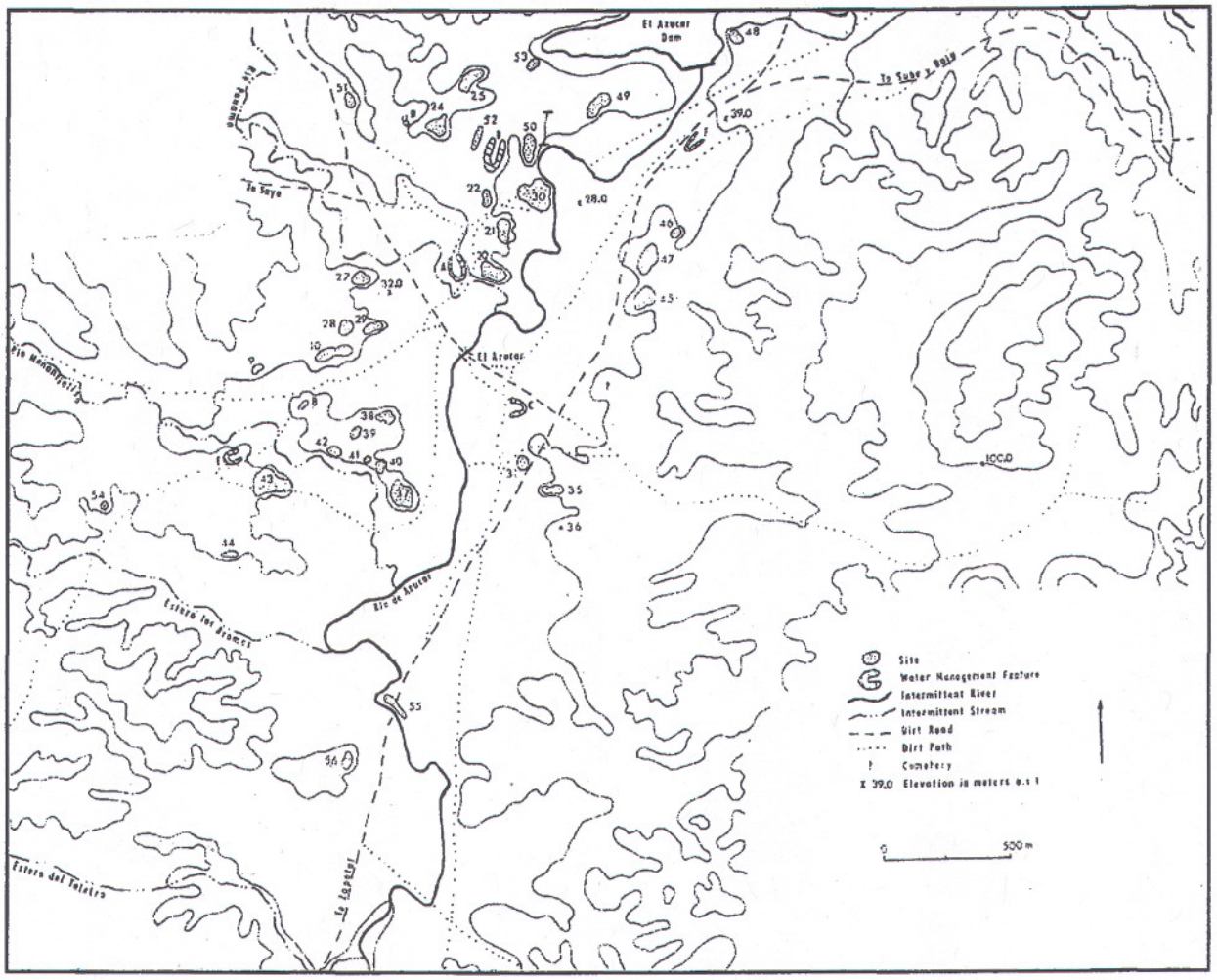

Figure 2.. El Azúcar Valley survey area with sites recorded in 1984, and in 1986-88. Sites 30, 43, and 47 are the locations of deep midden sites with evidence of intensive use, likely from multiple households. Contour interval is 25 m. (after Masucci 1992).

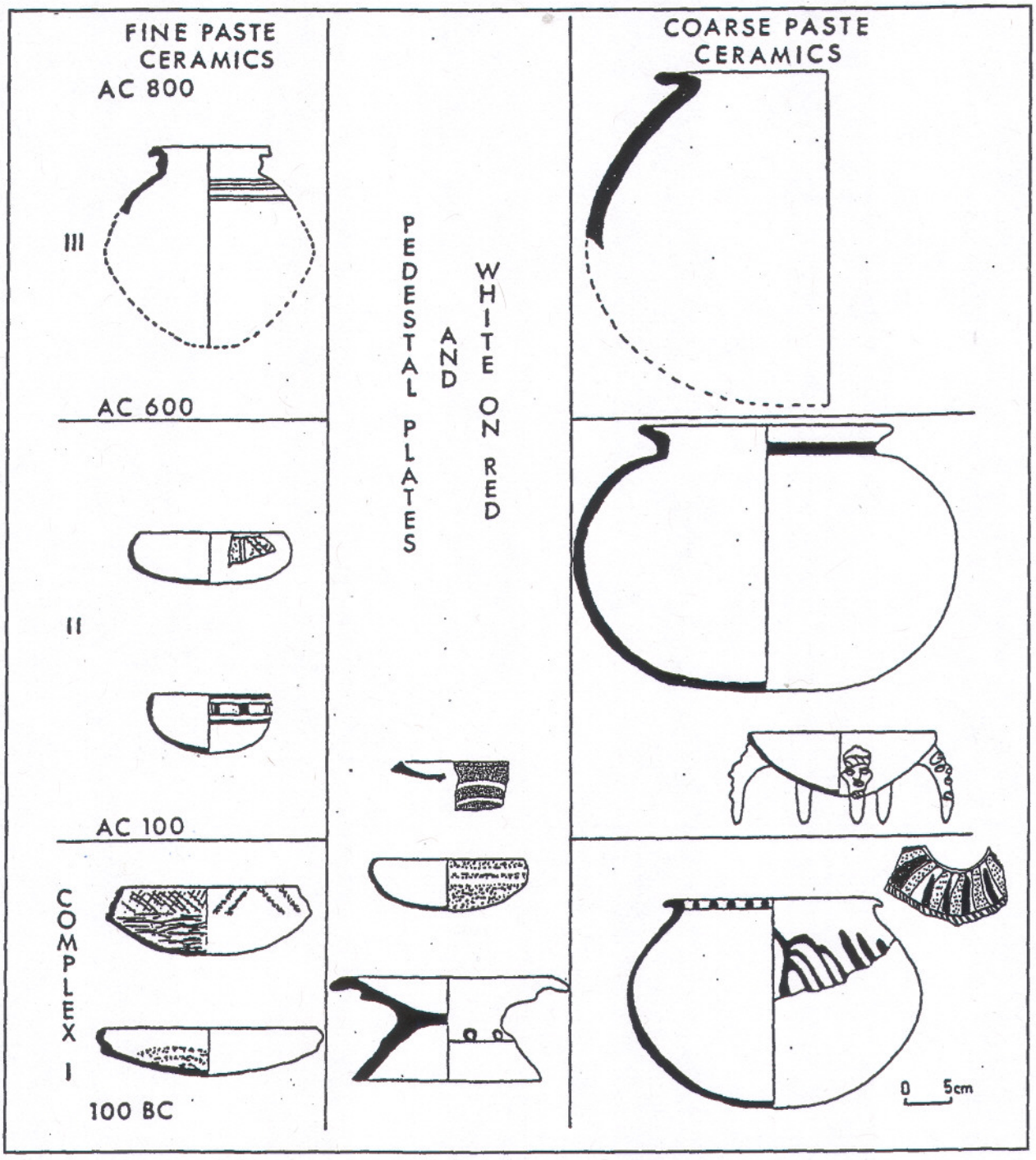

Figure 3. Summary Chronology of Guangala pottery types by complex (after Masucci 1994).

Figure 4. Coarse and fineware sherds from Complexes I and II. Complex I types pictured include jar with finger-paint decoration (top row, left); finewares with iridescent paint and pattern burnish decoration (top row, center and right); and sherd with white-on-red decoration (second row, left). Complex II types pictured are coarse ware jar rim with finger-paint decoration (bottom row, left); bichrome fineware (bottom row, center); and polychrome fineware (bottom row, right). Types spanning Complexes I and II are a grey striped sherd (second row, center top), an incised bowl (second row, center), a red striped ware (second row right of center), and a decorated leg from a multiple-legged bowl (second row, right).

Figure 5. Coarse wares from Complex I (top row), Complex II (center), and Complex III (bottom row). Note the thinner walls of Complex I jars and the rough, pitted exterior surface of Complex III vessels.

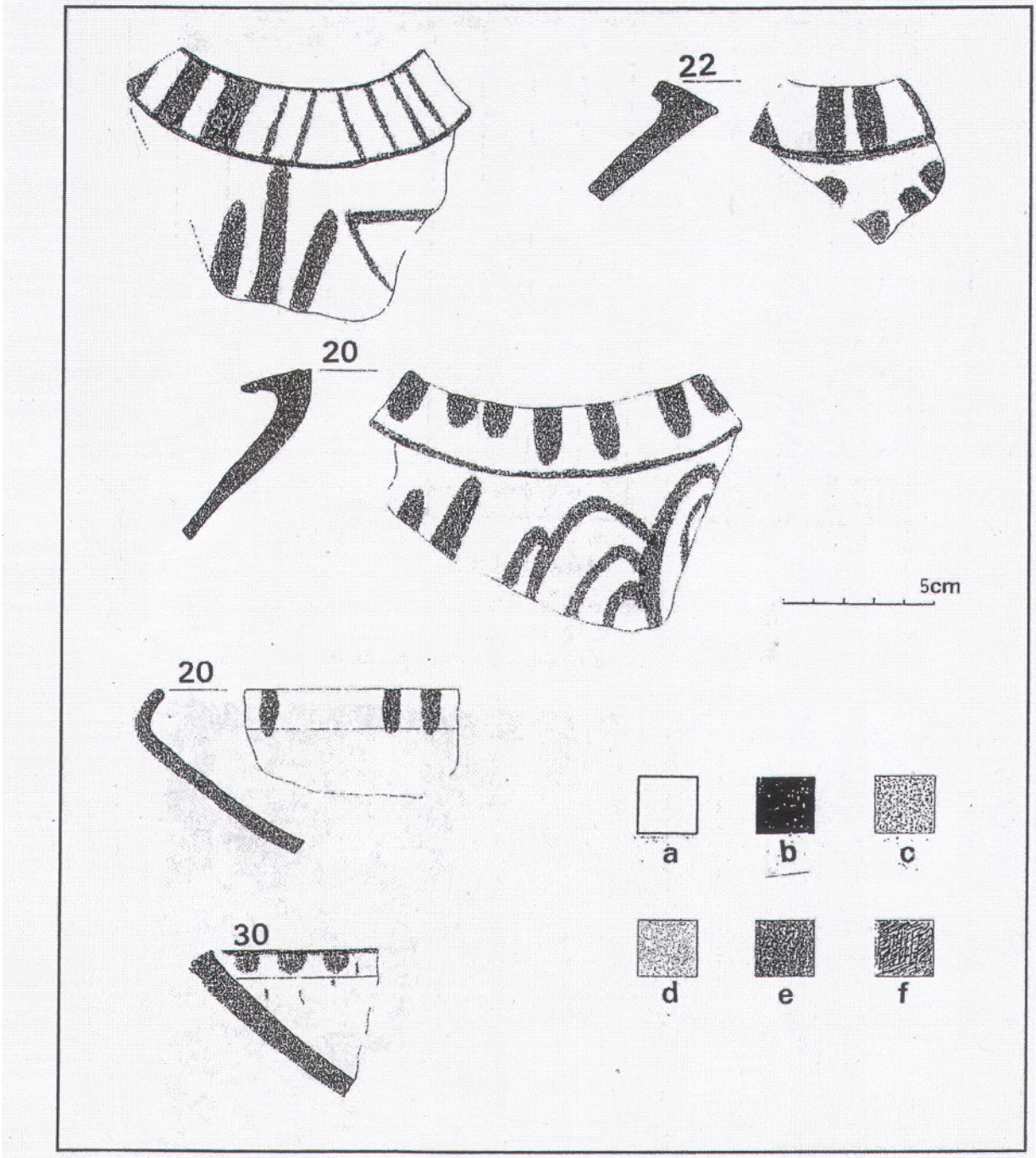

Figure 6. Examples of Complex I forms with figure-paint decoration (after Masucci 1992).

Color and decorative symbols for ceramic illustrations: white/cream (a); black/dark brown (b); red (c); iridescent paint (d); dark finger-paint (e); streaky burnish (f).

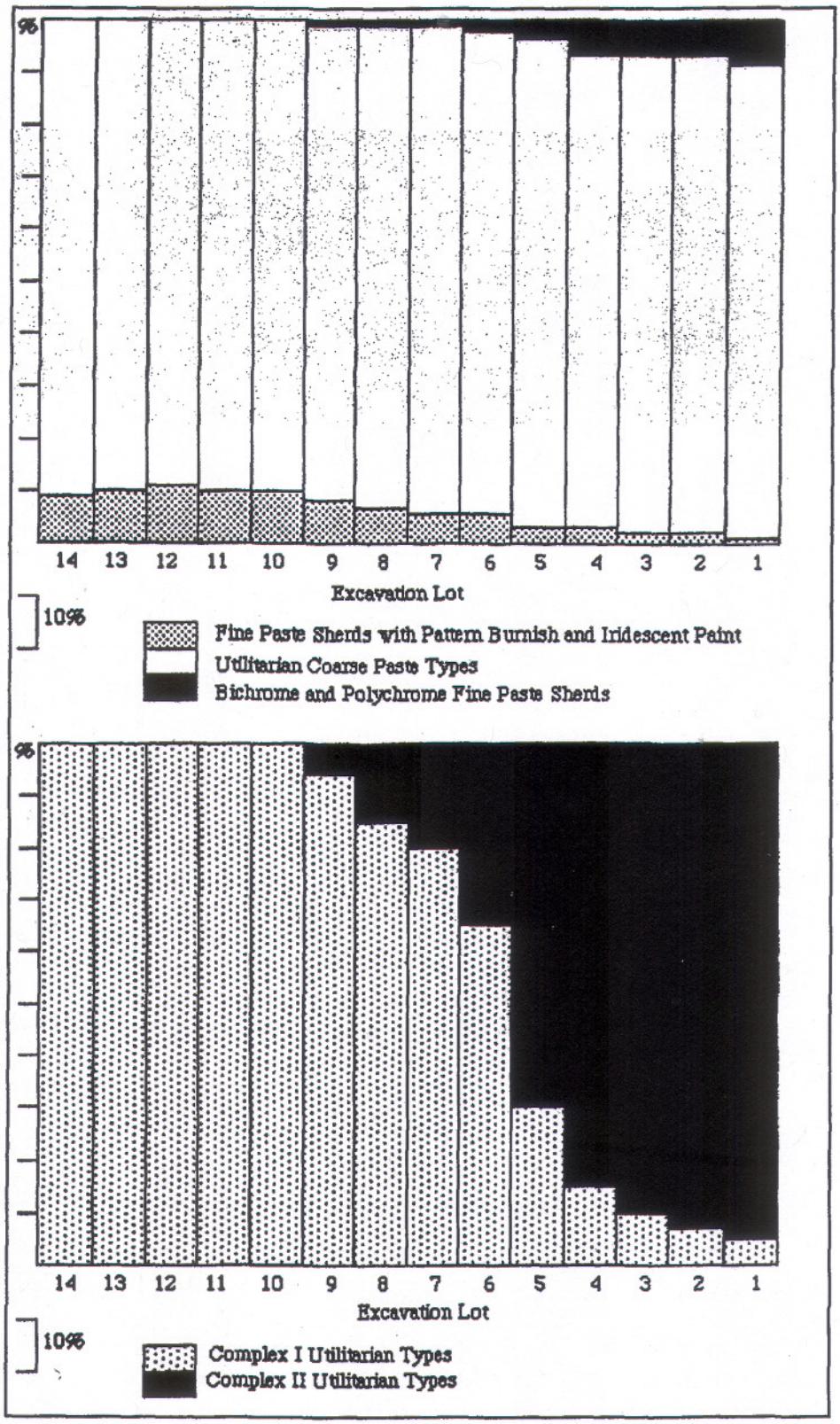

Figure 7. Summary of seriation of El Azúcar Site 47 primary trench ceramic assemblage (after Masucci 1992).

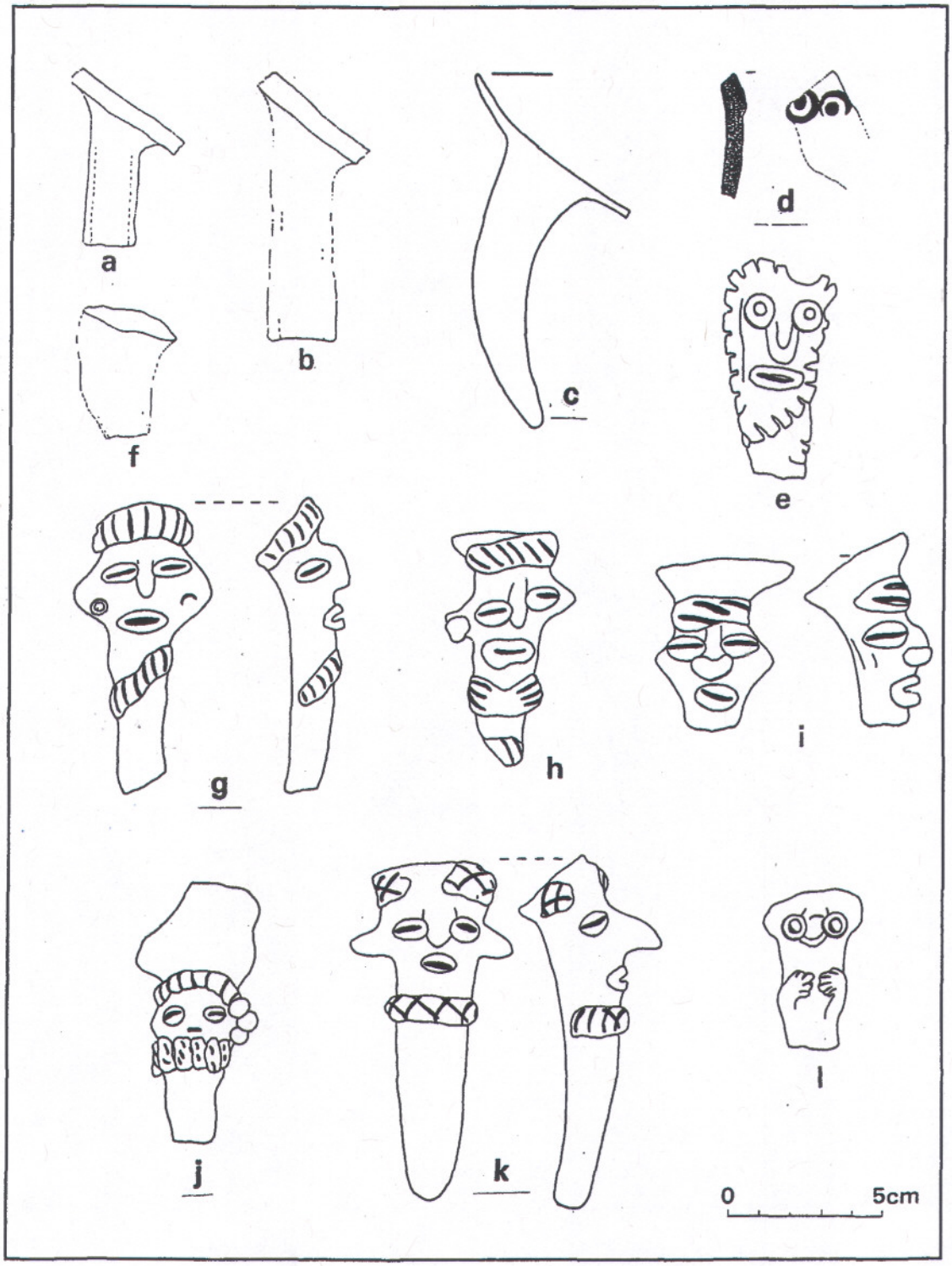

Figure 8. Polypod leg supports. Plain hollow and solid polypods are the earliest (a-c, f) followed at the end of Complex I by the appearance of appliqué decoration (d-e, g-l) (from Masucci 1992).

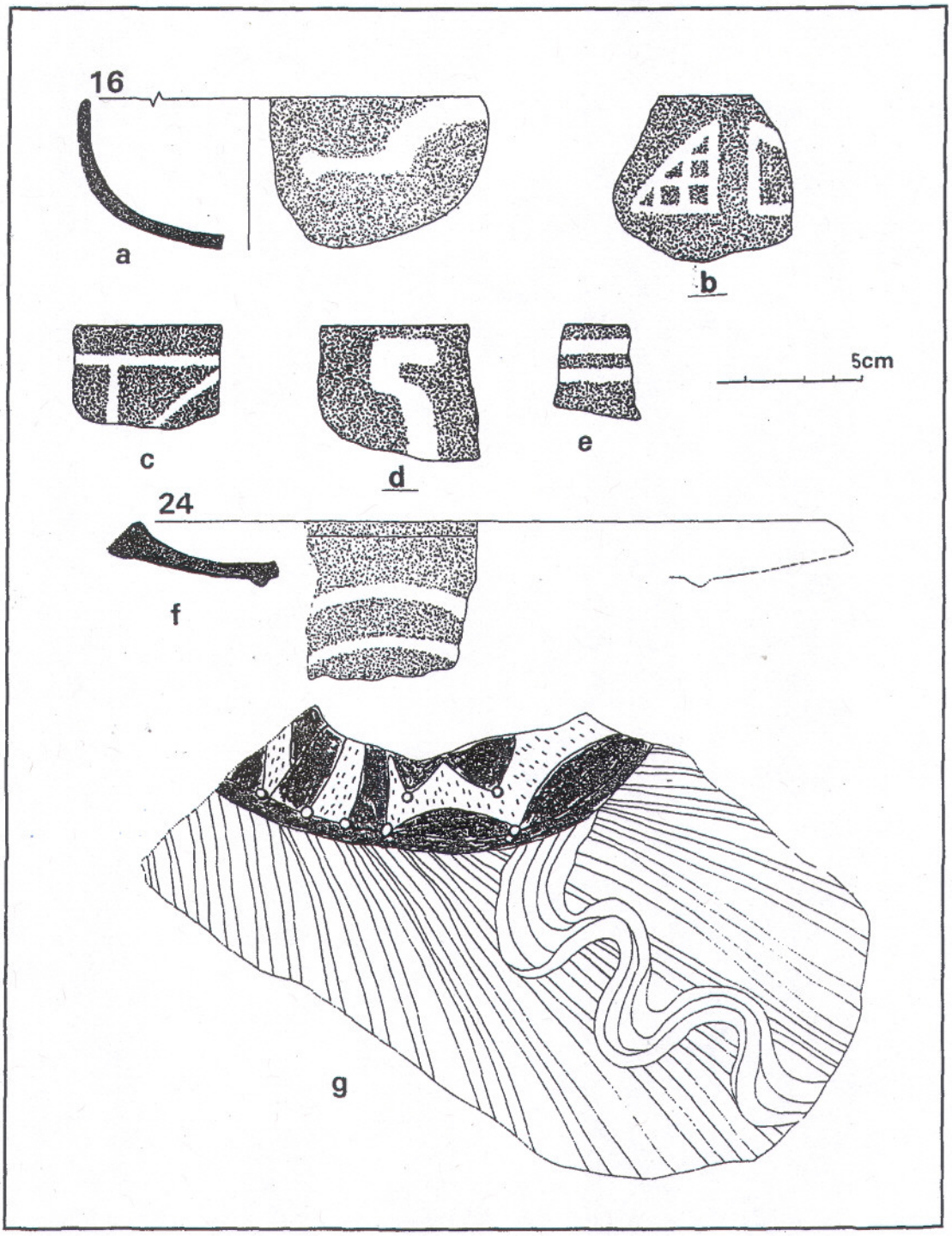

Figure 9. Decorative modes appearing in Complex I. White-on-red bowl and plate forms that continue through Complex II (a-f). Combination of appliqué pellets, zoned incision, finger-paint decoration, and punctates applied to the exterior upper body of a Guangala coarse ware vessel with painted stripes (g) (after Masucci 1992).

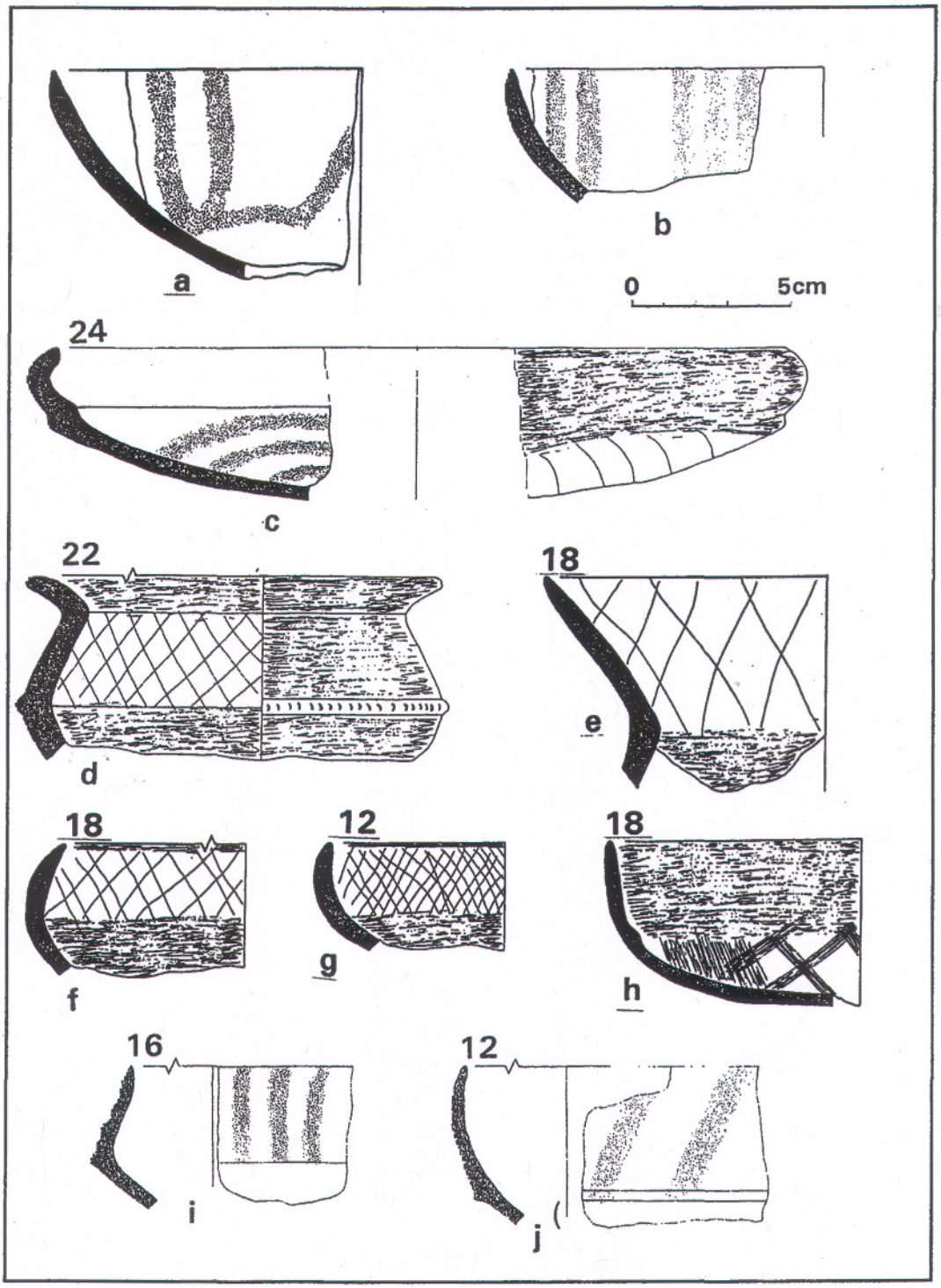

Figure 10. Examples of Complex I fineware forms and decorative modes: interior pattern burnishing (d-h); exterior pattern burnishing (c); interior iridescent paint (a-c); and exterior iridescent paint decoration (i-j). Note the complexity of wall form in contrast to the fineware forms of Complex II pictured in Figure 12 (after Masucci 1992).

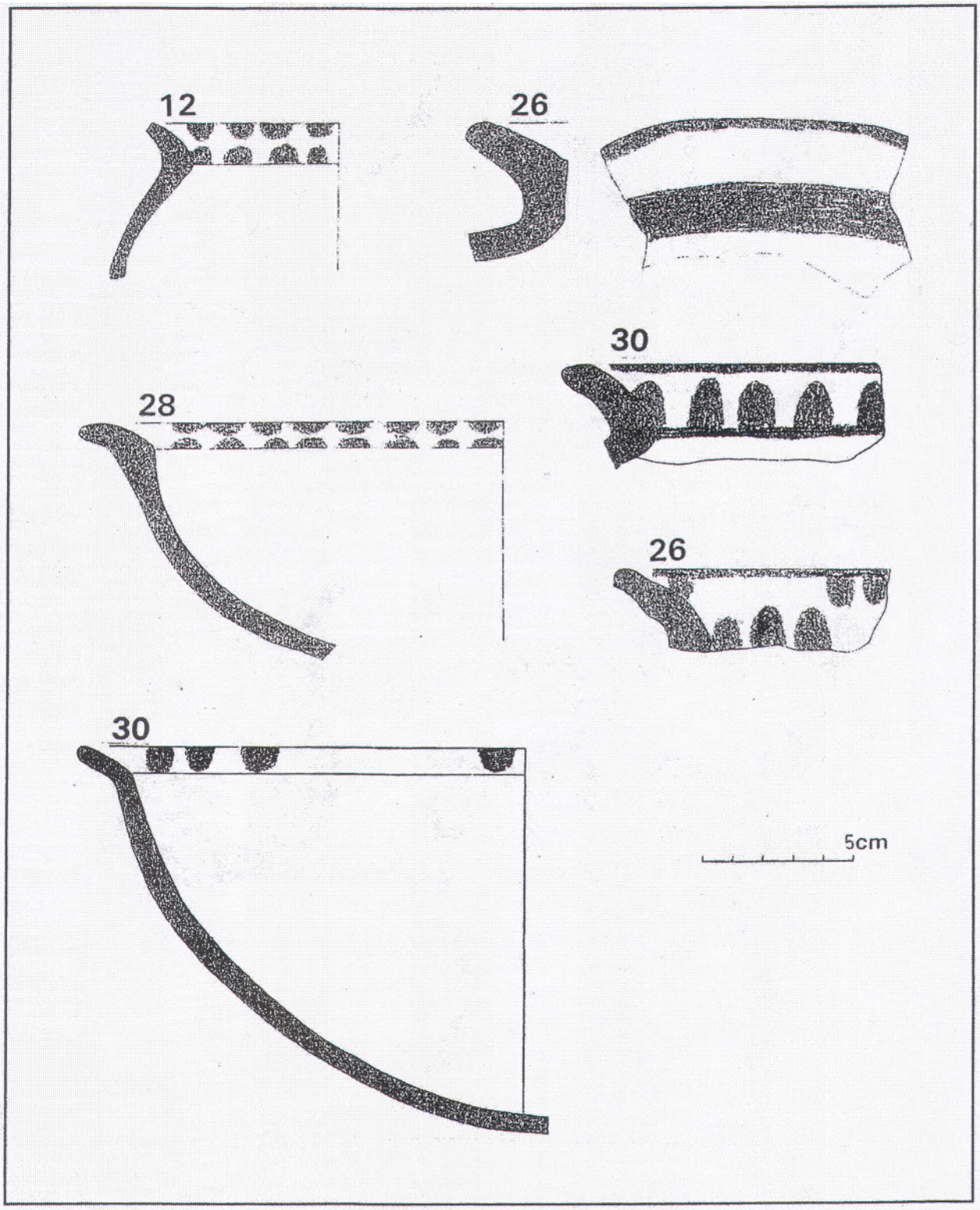

Figure 11. Examples of Complex II coarse wares. Note continued presence of finger-paint decoration alongside formal changes. These vessels also bear a thick red slip (after Masucci 1992).

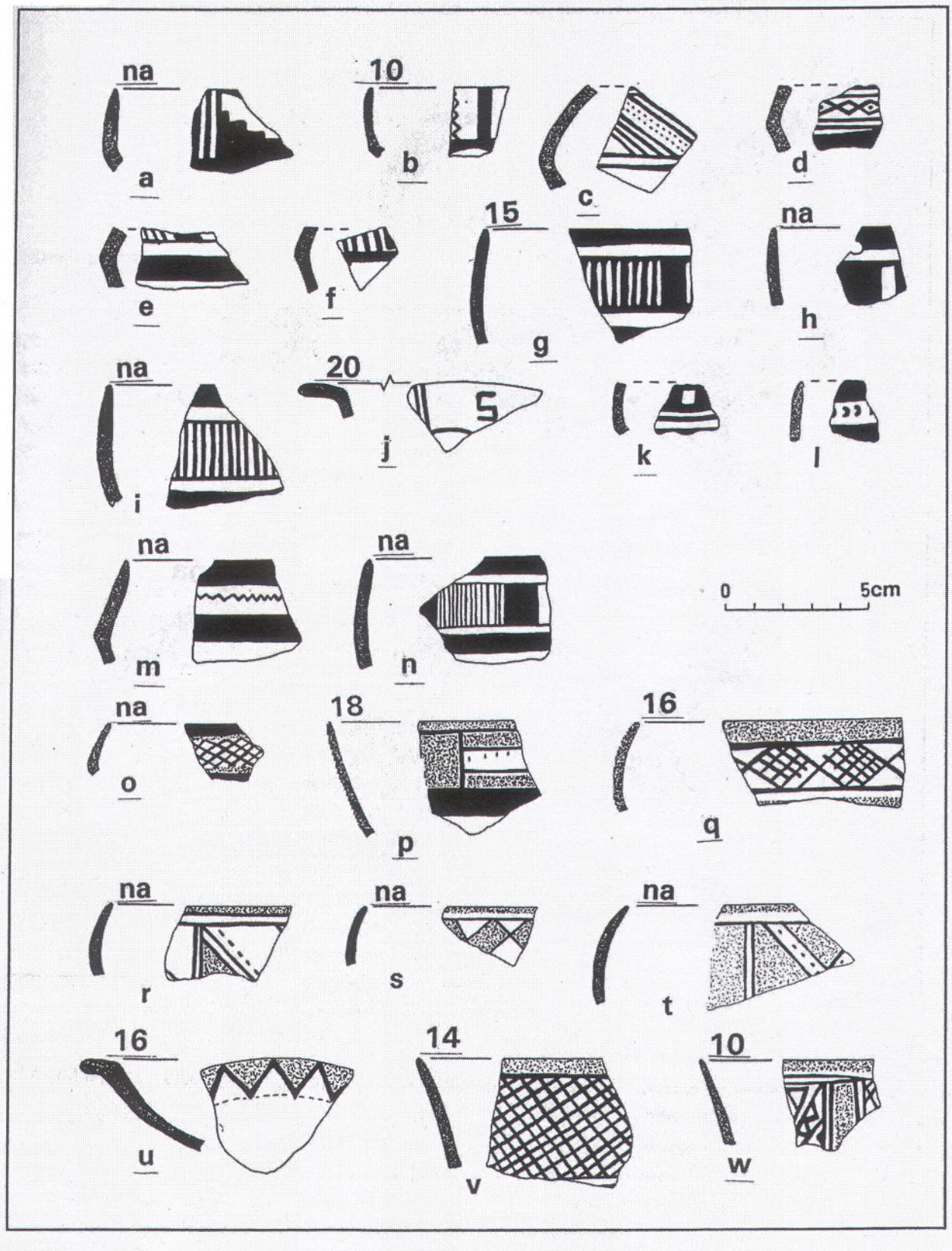

Figure 12. Two-colored (bichrome) decorated finewares (a-n) and three-colored (polychrome) decorated finewares (o-w) of Complex II (after Masucci 1992).

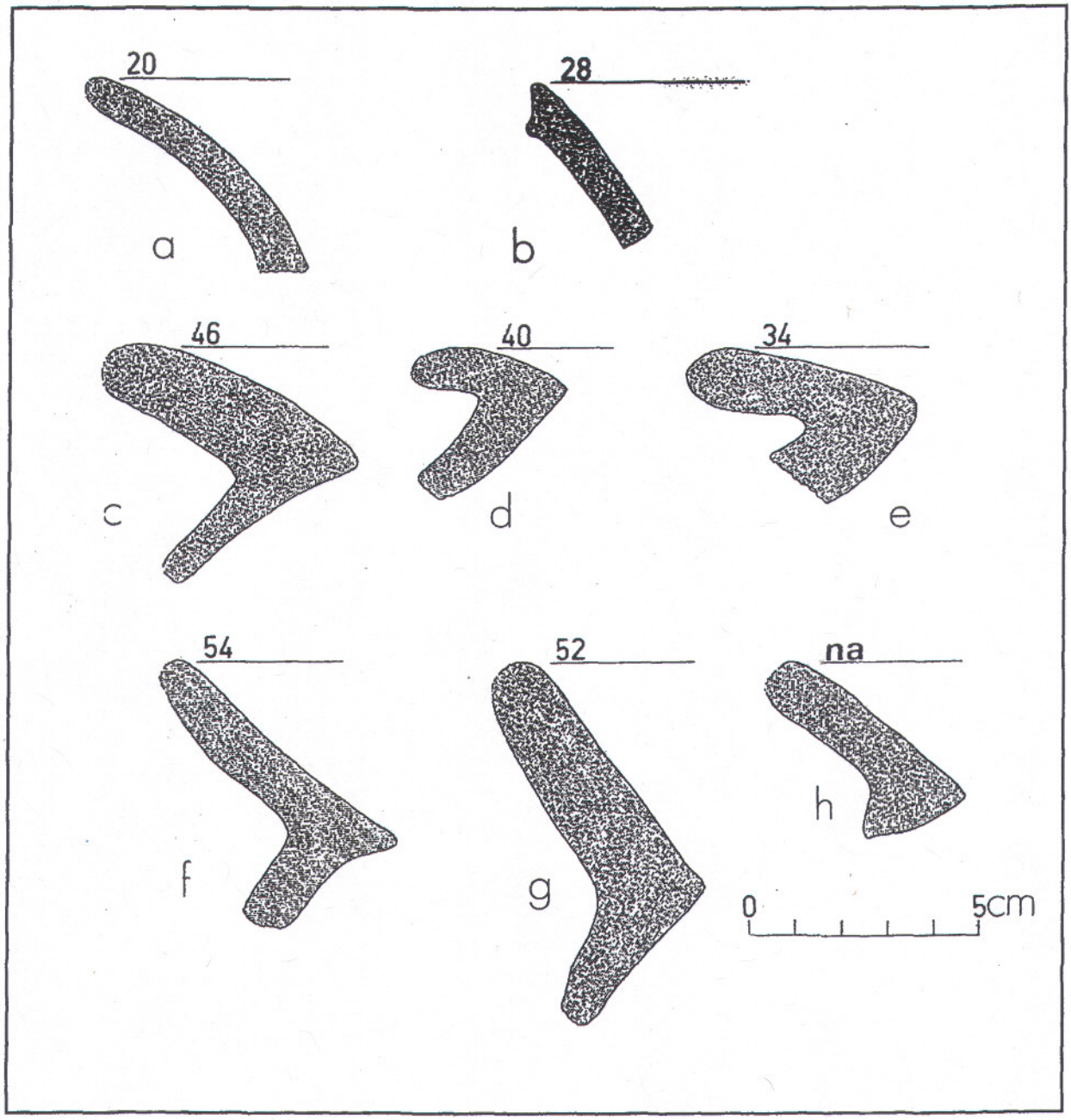

Figure 13. Form examples from Complex III: fineware jar rim forms (a-b); Type 1 coarse ware jar forms (c-e); Type 2 coarse ware jar forms (f-h).